## REMARKS

This Amendment is being filed in response to the Office Action dated July 29, 2008. In view of these amendments and remarks this application should be allowed and the case passed to issue. Support for the amendment to claim 10 is found throughout the specification and claims as originally filed, including claim 1.

Claims 1-10 are pending in this application. Claims 1-10 are rejected. Claim 10 has been amended in this response.

### *Interview Summary*

Applicant greatly appreciates the courtesy of Examiner Lewis in granting a telephone interview with the undersigned on July 16, 2008. During the interview, the undersigned inquired about how the Examiner was interpreting the term "channel." The Examiner explained that "channel" was being interpreted broadly in the absence of any express definitions in the specification. The Examiner also maintained that it would have been obvious to attach the polymer to the inner surface of the channel, unless there was an unexpected result.

### *Claim Rejections Under 35 U.S.C. § 103*

Claims 1-7 and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Reiser et al. (US 2004/0001982) in view of Kindler et al. (U.S. Pat. No. 6,440,594).

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reiser et al. in view of Kindler et al. and further in view of Kanno et al. (US 2003/0017375 A1).

These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the present invention, as claimed, and the cited prior art.

An aspect of the invention, per claim 1, is a fuel cell comprising an electrode structure including a cathode, an anode and an electrolyte between the cathode and the anode. A fuel gas passage is configured to conduct fuel to the anode. An air passage is configured to conduct air to the cathode. A separator is configured to supply the fuel to the fuel gas passage and a pure water channel is configured to allow flow of pure water and permit the pure water to pass into the separator. The pure water channel includes polymers respectively having polymer chains. One end of the polymer chains are connected to an inner surface of the pure water channel and are capable of forming an entanglement among themselves.

Another aspect of the invention, per claim 8, is a fuel cell comprising an electrode structure including a cathode, an anode and an electrolyte between the cathode and the anode. A fuel gas passage is configured to conduct fuel to the anode. An air passage is configured to conduct air to the cathode. A pure water channel is configured to allow flow of pure water and permit the pure water to pass into the separator. The pure water channel includes polymers respectively having polymer chains. One end of the polymer chains are connected to an inner surface of the pure water channel and capable of forming an entanglement among themselves. The fuel cell further comprises a means for discharging the pure water in the pure water channel to outside of the fuel cell when the fuel cell is shut down.

Another aspect of the invention, per claim 10, is a method of operating a fuel cell wherein the fuel cell comprises an electrode structure including a cathode, an anode and an electrolyte between the cathode and the anode. A fuel gas passage is configured to conduct fuel to the anode and an air passage is configured to conduct air to the cathode. A separator configured to supply the fuel to the fuel gas passage and a pure water channel has a polymeric material contained therein. The method comprises permitting water to flow through the channel and pass

into the separator when operating the cell and holding the water in the polymeric material when the cell is not operating.

The Examiner asserted that Reiser et al. disclose a fuel cell system comprising a cathode (74), an anode (72) and a polymer electrolyte membrane (70), a fuel passage (94), an air passage (92), a separator (84), and a pure water channel (96), which allows the pure water to pass into the separator. The Examiner acknowledged that Reiser et al. do not teach the pure water channel including polymers respectively having polymer chains. The Examiner averred that Kindler et al. teach a fuel cell with N-isopropyl acrylamide attached to the surface of a biplate. The Examiner concluded that it would have been obvious to treat the surfaces of the water channels of the biplates with N-isopropyl acrylamide polymer to facilitate the flow of water. The Examiner considered it inherent that water flowing through the water channels would break up the polymer entanglement and that when the fuel cell is not operating some water will remain in the water channels and be held in the N-isopropyl acrylamide.

Reiser et al. in view Kindler et al. do not suggest the claimed fuel cell and method of operating a fuel cell because Reiser et al. and Kindler et al., whether taken alone or in combination, do not suggest a pure water channel configured to allow flow of pure water and permit the pure water to pass into the separator, the pure water channel including polymers respectively having polymer chains, one end of the polymer chains being connected to an inner surface of the pure water channel and capable of forming an entanglement among themselves, as required by claims 1 and 8; and permitting water to flow through a pure water channel having a polymeric material contained therein and pass into the separator when operating the cell and holding the water in the polymeric material when the cell is not operating, as required by claim 10.

The term "channel" as used in the present claims is a hollow structure. The specification, claims and drawings all define the pure water channel as a hollow structure. As shown in the drawings, the pure water channel has an inner surface. Conversely, a structure without a hollow, such as a plate-like structure, would not have an inner surface. In addition, the pure water channel and the separator are distinctive components of the fuel cell, as they are independently recited limitations in the claims.

The cited references fail to teach or suggest a hollow structure pure water channel configured to allow flow of pure water and permit the pure water to pass into the separator, the pure water channel including polymers respectively having polymer chains, one end of the polymer chains being connected to a surface of the pure water channel and capable of forming an entanglement among themselves. The biplates of the fuel cells disclosed by Kindler et al. are plate-like structures, not hollow structures. Further, Kindler et al. teach that the biplate is a two-sided separator. Thus, the biplate is not a distinct body from the separator, as required by the present claims. Furthermore, Reiser et al. and Kindler et al. do not suggest a connection of polymer chains capable of forming an entanglement among themselves to an inner surface thereof.

There is insufficient suggestion in the references to combine them in the manner suggested by the Examiner. Kindler et al. teach treating the surface of the flow field element, where the fuel passes, with a hydrophilic polymer treatment (column 16, line 22 et seq.) to **prevent water accumulation in the fuel passage**. In the present invention, on the other hand, the hydrophilic polymer is connected to the inner surface of the pure water channel, not the fuel passage. Because the pure water channel is supposed to transport water there is no motivation to treat it with the hydrophilic polymer to prevent water accumulation.

The present invention provides benefits not achieved by the prior art fuel cells. The claimed pure water channel controllably stores a considerable amount of water during a shut-down of the fuel cell. Closing the pure water channel leads to retention of the amount of water and blowing into the pure water channel leads to a reduction in the amount of water. The stored water may be used at a time of a startup of the fuel cell. On the other hand, the hollow structure is subject to clogging caused by frozen water if the ambient temperature is below the freezing point. Frozen water prevents a quick startup. The polymers having polymer chains capable of forming an entanglement among themselves connected to the inner surface of the pure water channel prevents water therein from freezing and simultaneously keeps a considerable amount of water in the entanglement. Thereby, the claimed subject enables quick startup of the fuel cell even when ambient temperature is below the freezing point, as explained in specification (paragraph [024]).

Kanno et al. do not cure the deficiencies of Reiser et al. and Kindler et al., as Kanno et al. do not suggest a pure water channel configured to allow flow of pure water and permit the pure water to pass into the separator, the pure water channel including polymers respectively having polymer chains, one end of the polymer chains being connected to an inner surface of the pure water channel and capable of forming an entanglement among themselves.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in Reiser et al.,

Kindler et al., or Kanno et al. to modify the fuel cell and method of Reiser et al. so that they include a pure water channel configured to allow flow of pure water and permit the pure water to pass into the separator, the pure water channel including polymers respectively having polymer chains, one end of the polymer chains being connected to an inner surface of the pure water channel and capable of forming an entanglement among themselves, as required by claims 1 and 8; and permitting water to flow through a pure water channel having a polymeric material contained therein and pass into the separator when operating the cell and holding the water in the polymeric material when the cell is not operating, as required by claim 10, nor does common sense dictate such modifications. The Examiner has not provided any evidence that there would be any obvious benefit in making such modifications to Reiser et al. *See KSR Int'l Co. v. Teleflex, Inc.*, 500 U.S. ____ (No. 04-1350, April 30, 2007) at 20.

The only teaching of a fuel cell including a pure water channel configured to allow flow of pure water and permit the pure water to pass into the separator, the pure water channel including polymers respectively having polymer chains, one end of the polymer chains being connected to an inner surface of the pure water channel and capable of forming an entanglement among themselves, and a method permitting water to flow through the channel and pass into the separator when operating the cell and holding the water in the polymeric material when the cell is not operating, is found in Applicant's disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The dependent claims are allowable for at least the same reasons the independent claims from which they depend and further distinguish the claimed fuel cell.

In view of the above amendments and remarks, Applicant submits that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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